YINAN (STEVE) LIU

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Education

Johns Hopkins University, Robotics	2023.08-2025.05	3.85 / 4.0
Monash University, Material Engineering	2016.03-2017.12	4.0 / 4.0
Wuhan University of Technology, Material Engineering	2013.09-2018.01	3.78 / 4.0

Technical Skills

- Skillful in programming languages: C, C++, Python, Matlab, Javascript, ReactJS, VueJS, SQL, CSS, HTML, Shell, PowerShell, CMake
- Skillful in Software Management Tools: Bamboo, Jira, Fisheye, Miro, Git, Agile, unittest, GoogleTest, Pester
- Skillful in mechanical and statistical softwares: Creo, Solidwork, Comsol, Abaqus, Minitab
- Skillful in robotics applications: ROS, RTDE, Sunrise
- Skillful in electrical layout and simulation softwares: AD, Multisism, Keil, CubeMX
- Skillful in Adobe softwares: PS, AI, AE, PR, DaVinci Resolve

Patents

- Liu, Yinan. 2020. MONOPOLAR SURGICAL APPARATUS. WO/2021/217339, filed Apr. 27, 2020, and issued Nov. 04, 2021.
- Liu, Yinan. 2019. ELECTROSURGICAL SYSTEMS. US/2022/0273360, filed Aug. 07, 2019, and issued Sep. 01, 2022.
- Liu, Yinan. 2022. UNIVERSAL ADAPTOR FOR AN IMAGING DEVICE AND CORRECTOR ASSEMBLY. WO/2023/178631, filed Mar. 25, 2022. Issued Sep. 28, 2023.

Work and Project Experience

Medtronic

Hugo RAS System

Software Engineer 2024.06 – 2024.12

- Developed and validated over 10 software automation tools on different OSs (QNX, Linux, Windows) for field service engineers, significantly reducing deployment time and minimizing human error during on-site operations.
- Led and participated in developing a CyberArk-based application for secure and reliable certificate provisioning to register sub-systems in Hugo™ system; created comprehensive test plans, defined functional requirements, and executed testing for robust system performance using tools e.g. Postman and Wireshark.
- Defined and implemented diverse test automation techniques (unittest, GoogleTest, Pester), to ensure comprehensive software test coverage in manufacturing and field service operations.
- Involved in building an inference engine that performs log analysis on SQLite data and automatically generate diagnostic queries for system debugging when deployment and runtime.

Spine Robotics and Optical Navigation System

Sr System Verification Engineer 2020.03-2023.07

- Designed and validated a robotic image correction adapter to make it compatible with more medical imaging devices.
- Developed and implemented test automation frameworks for embedded real-time systems and robotic software, incorporating unit testing, GUI testing (Ranorex), integration, and stress testing to ensure reliability and system robustness.
- Led hardware testing for robotic systems, including board-level validation, signal integrity checks, environmental tests, and reliability tests; utilized tools such as oscilloscopes, multimeters, logic analyzers, and environmental chambers to verify performance against specifications.
- Spearheaded the development of a robotic platform with QT-based GUI for unit testing, reliability testing, system integration, and calibration, achieving absolute accuracy under 0.7 mm after kinematic parameter calibration.
- Used Minitab to perform various statistical analyses including ANOVA, t-test, tolerance interval, and Gage R&R.
- Utilized various mechanical fixtures, metrological device and sensors, and optical trackers e.g., NDI, CMM (Hexagon, Faro, and Zeiss) to collect data and analyze the static and dynamic performances of the robotic system.
- Familiar with the product of several automation and robotic arm suppliers, e.g., BECKOFF, Stäubli, KUKA, UR,

SIASUN (CN), and ROKEA (CN).
- Familiar with standard test (IEC60601-1, -1-2, GB9706.1, YY0505...etc.).

Innovative Electro-surgical System

Product Engineer 2018.09-2020.03

- Designed moderately complex electromechanical/mechatronic electrosurgical system and subsystems parts.
- Developed the pneumatic manifold in the electrosurgical system with Camouzzi, Parker Hannifin, and Bürkert. Formulated a verification plan according to the design requirements to evaluate the function and reliability of the pneumatic subsystem.
- Evaluated the manufacturability and validated the production line with AME.
- Developed and fine-tuned PID control algorithm, enhancing the performance of a proportional valve in dynamic conditions.
- Designed, implemented, and validated control software for a pneumatic manifold subsystem using STM32 MCU.
- Used Abaqus for two fluid interface interaction simulations. Verified the simulation by a custom setup with a high-speed camera and auto-capture algorithm.

Ultrasonic Scalpel

Associate Product Engineer 2018.01-2018.09

- Designed core components' mechanical structures (the transducer and the waveguide).
- Analyzed the piezoelectric effect and thermal effect to optimize product design parameters using COMSOL.
- Utilized GD&T (Geometric Dimensioning & Tolerancing) systems per ASME standards Y14.5M-1994 and tolerance analysis in 2D and 3D.
- Utilized product life cycle management software such as Windchill, Agile, and JIRA to document reports.
- Designed and built prototypes using additive manufacturing techniques, CNC, electrical discharge machining, wire cut and lathe.
- Assisted senior engineers to design plastic injection mold, optimized parameters for ultrasonic welding, laser welding metal injection molding, and ceramic injection molding.

Research Project

DDS Middleware for Surgical Robotics

Research Assistant (CIS2 @ JHU) 2025.02 – 2025.05

- Developed RTI DDS middleware for IPC of dVRK platform to enhance the system latency performance.
- Integrated middleware with CISST components via two linkage methods, enabling multiprocess support and thread safety and benchmarked performance against ROS middleware.

Dynamic Control System Optimization

Software Engineer (Builder @ Medtronic) 2024.06 – 2024.12

- Developed a universal auto code generation workflow for serial robotic arms (e.g., UR5) using Simulink, Jinja2, and rtiddsgen, enabling precise modeling, simulation, and end-to-end deployment for real-time applications.
- Evaluated latency performance of ROS 2 vs. RTI DDS cross SHMIO and UDP protocols. Compared various DDS tuning parameters and hardware configurations to optimize real-time performance.

Automatic Surgical Robot for Neuro-pixel Insertion

Robotic Engineer (Tim Harris Lab @ JHU) 2024.02 – 2024.06

- Develop a surgical robot solution to automate the Neuro-pixels insertion surgery (approx. 13-16 hrs) with the goal of enabling probe count experiments in rodents.
- Design the control system for MECA 500 and micromanipulators and optimize the end-effector tooling for craniotomies / durotomies / probe insertion.
- Developed the entire application using tauri framework (front-end GUI using VueJS and back-end control system using FASTAPI) for MECA 500 with digital twin visualization (ThreeJS), robotic manipulation (kinematics and dynamics), probe path planning, obstacle avoidance, and optimized end-effector tooling for craniotomies/durotomies/probe insertion.

3D CAD Model Annotation for Neural Network Prediction/Generation

Research Assistant (CCVL Lab @ JHU) 2024.01 – 2024.03

- Use Blender to annotate more than 50+ categories of 3D CAD models.
- Use Python script to extract data, and organize and inspect the quality of the annotations.

Semi-Supervised Learning with Unlabeled Data in Multi-Organ Segmentation

Course Project 2023.09 - 2023.11

- Implement e π-Model and Mean Teacher to leverage unlabeled data in datasets via consistency training.

- Fine tune SAM to a dedicated medical images model. Use the strong generalization to improve the pre-trained model as pseudo-labels.

Avalanche and Landslide Modelling: Flow Dynamics and Force Interaction with Structures

Research Assistant (Supervisor: Prof. Ha Bui @ Monash) 2016.11-2017.02

- Applied a mesh-free Smoothed Particle Hydrodynamics (SPH) algorithm due to the limitation of traditional simulation methods in large deformation problems.
- Evaluated the algorithm predictive capability in MATLAB and optimized the parameters to simulate a scale-down physical experiment of debris flow.
- Found that SPH could capture the moderately fast flow morphology and trace the changing tendency of impact forces. Solved the underestimation of impact force and unexpected boundary conditions.

Synthesis of Two-Dimensional Organic-Inorganic Perovskite and Heterostructures

Research Assistant (Supervisor: Prof. Qiaoliang Bao @ Monash) 2017.02-2017.12

- Developed two possible synthesis methods for single-unit-cell organic-inorganic halide perovskite.
- Analysis the material electrical properties of charge transport property and surface potential by AFM.
- Fabricated an optoelectronic device to analyze the ion migration property of perovskite.

Certificates and Awards

- Language skills: Chinese (native), English (fluent)
- *AWS Certified Solutions Architect – Professional (SAP),* AWS, issued 2021, Credential ID 5M3V4S9JKJREQ6K6
- *Project Management Professional, Project Management Institute,* issued 2021, Credential ID 3123635
- *IEC60601-1&IEC60601-1-2 Training CourseIEC60601-1&IEC60601-1-2 Training Course SGS*, issued 2022, Credential ID SGS/MED/SHA221014
- *Cooperate* Awards in Medtronic:
  - Best Rookie Award (Top 3 in R&D department), 2018;
  - Innovator Award (Top 1 in Medtronic Technology Center), 2020;
  - Star of the Year Award (Top 10% in Medtronic), 2021;

Other Activities

'Angel Loves Science' (a name of public welfare community)

Instructor & Ambassador & Leader in Shanghai Region 2019.01-2023.07

- Lead community volunteers (clinician, engineers, marketers) to design and deliver education sessions to Shanghai Primary Schools, popularize the knowledge of science and its' application in healthcare.

Medtronic Engineering Leadership Council

Workstream Leader in Strategic Capabilities Building 2018.06-2023.07

- Lead and organize the leadership development trainings/workshops to enable engineers' communication, presentation and storytelling skills.

Medtronic Product Clinical Evidence Dissemination

R&D Opinion Representative 2018.05-2022.6

- Researched more than 300 Medtronic product publications. Investigated the utility of the products in new operations and developed the operation training materials.

Monash Human Power Team

Leader of shell design and manufacturing 2016.05-2017.6

- Simulated and designed the shell for the vehicle with regarding to ergonomics and aerodynamics and other engineering factors. Investigated innovative manufacturing method and material to greatly reduce the shell weight.